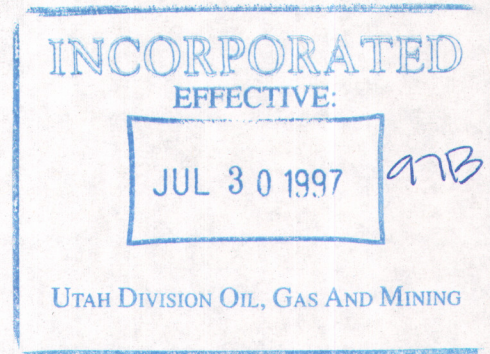


APPENDIX 3-14

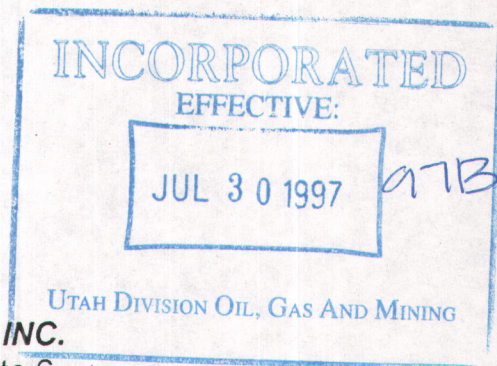
**WOODY PLANT SPECIES DENSITY MEASUREMENTS OF THE
PROPOSED DISTURBED RIPARIAN AREAS OF CRANDALL CREEK
JUNE 1997**



***WOODY PLANT SPECIES DENSITY
MEASUREMENTS OF THE
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OF CRANDALL CREEK***

1997





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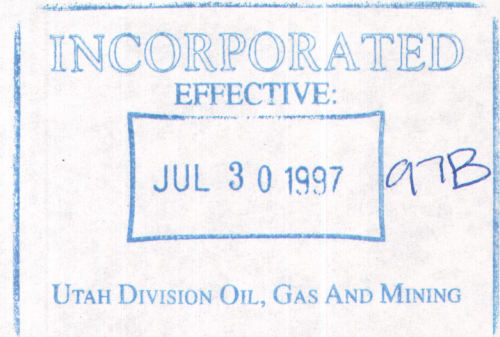
for

ANDALEX RESOURCES, INC.

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June 1997

INTRODUCTION

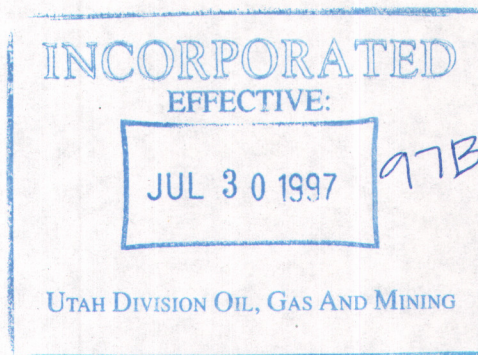


The Crandall Canyon Mine is situated within Crandall Canyon, a tributary of Huntington Canyon. These canyons are located within a portion of the Wasatch Plateau in Emery County, Utah. Elevation of the study area ranged from 7,770 ft to 7,850 ft above sea level.

An area has been proposed for disturbance to accommodate expansion of the coal mine's surface facilities. The proposed disturbed area would primarily affect riparian and spruce/fir/aspen plant communities. The spruce/fir/aspen communities have been sampled previously (July 1996) and reported by *MT. NEBO SCIENTIFIC, INC.*

(February 1997). Although vegetation sampling has also been conducted earlier in the riparian area by EIS (August 1995), biologists from the State of Utah, Division of Oil, Gas & Mining (DOGM) determined that woody species density measurements were also necessary as required by state regulations. This report documents results from woody species sampling within the riparian area at the Crandall Canyon mine site.

METHODS



Woody Plant Species Density

Density of woody plant species of the proposed disturbed areas were made using belt transects. These 5 ft by 25 ft belts were placed randomly adjacent to the creek in the areas where the stream flow influences the vegetation. Most of the entire length of the area that was proposed for disturbance were represented by the transects.

Total number of individuals by species were counted in each of the belt transects. The average number was then calculated followed by the number of individuals per acre.

Sample Adequacy

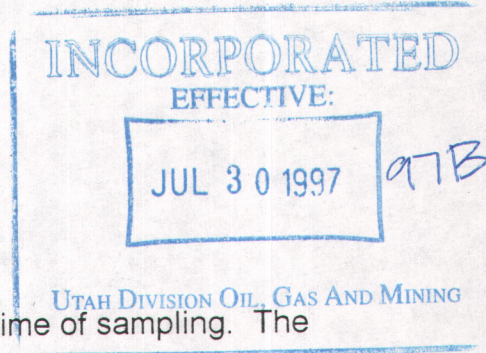
Sampling adequacy was calculated using formulas from Cochran (1977), with the goal of at least 80% confidence level with a 10% change in mean. The formula used is given below.

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

$nMIN$	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation
x	= sample mean
d	= desired change from mean

Photographs



Color photographs were taken of the study area at the time of sampling. The photographs were not included in this report but are available upon request.

RESULTS

Total woody species density was estimated to be 11,224 individuals per acre in the riparian area. The most important woody plant species by density were Wood's rose (*Rosa woodsii*), whiplash willow (*Salix lucida*), and red-osier dogwood (*Cornus sericea*). Results of all species densities are shown on Table 1.

TABLE 1: Woody species densities of the proposed disturbed riparian areas of Crandall Creek.

	NUMBER/ACRE
<i>Chrysothamnus nauseosus</i>	217.80
<i>Cornus sericea</i>	1756.92
<i>Juniperus scopulorum</i>	29.04
<i>Populus tremuloides</i>	479.16
<i>Picea pungens</i>	14.52
<i>Pseudotsuga menziesii</i>	29.04
<i>Ribes viscosissimum</i>	14.52
<i>Rosa woodsii</i>	6112.92
<i>Salix lucida</i>	1960.20
<i>Sherperdia canadensis</i>	43.56
<u><i>Symphoricarpos oreophilus</i></u>	<u>566.28</u>
TOTAL MEAN DENSITY	<u>11223.96</u>
(STANDARD DEVIATION)	(3483.32)

